

APPENDIX F

RESULTS OF BUSINESS ACTIVITY SURVEYS

The purpose of this appendix is to characterize and describe business responses in the areas surrounding four monitoring locations in greater detail. Emissions from area sources are commonly based on a surrogate measure such as the number of employees at businesses engaged in the activity of interest. For this reason, the following presentation reports survey results from businesses as to the number of employees working by day of week and hour of day.

The business density in each of the four locations surveyed varied significantly. As a result, businesses contacted were distributed as follows. About 20% of the respondents were near Azusa, 5% of the businesses were located in Industrial Hills, 68% in near Los Angeles N. Main, and 7% in Pico Rivera.

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F-1. RESULTS OF BUSINESS ACTIVITY SURVEYS

As shown in **Table F-1**, the largest single emissions-related activity engaged in by small businesses in this survey was the use of solvents (14% of those surveyed engaged in this activity). Next in order of occurrence was engine oil usage and internal combustion engine operation at 9%, and then gas ovens at 6%. None of the businesses surveyed reported being actively involved with pesticides or fertilizers.

Table F-1. Emissions-related business activity.

ACTIVITY	% OF BUSINESSES SURVEYED INVOLVED IN THIS ACTIVITY
Engine Oils	9%
Gas Ovens	6%
IC Engines	9%
Pesticides/Fertilizers	0%
Solvents	14%
Any of the above	20%

Table F-2 shows the percentage of workers employed at surveyed businesses overall and by activity of interest by day of week (WD, Saturday, Sunday). Worker hours decline by activity on Saturdays by factors of 2 to 5 relative to weekdays and on Sunday by factors of 4.5 to 19 relative to weekdays. All respondents, regardless of activity type, had nearly identical WD-WE activity profiles, except those for gas ovens which were twice as active on Saturday as any other activity.

The survey also asked businesses the number of employees who were at work in six time periods representing the following 4-hour shifts: midnight to 4 a.m., 4 a.m. to 8 a.m., 8 a.m. to noon, noon to 4 p.m., 4 p.m. to 8 p.m., and 8 p.m. to midnight.

Table F-2. Business activity in terms of percentage of workers employed by day of week.

BUSINESS ACTIVITY	WEEKDAY (MONDAY-FRIDAY)	SATURDAY	SUNDAY
All Survey Respondents	18%	5%	4%
Use of Engine Oils	18%	5%	4%
Use of Gas Ovens	18%	9%	3%
Operation of Internal Combustion Engines	18%	5%	4%
Use of Solvents	19%	4%	1%

Table F-3 lists the percentage of workers employed by 4-hour shift of the day based on all survey respondents and by activities. While all respondents and those with specific activities show a maximum number of hours worked occurring in the day shift (8 a.m. to 4 p.m.), the percentage of hours worked in other shifts differ greatly depending upon the activity.

Businesses using engine oils and those operating internal combustion engines reported identical levels of activity. For clarity, only internal combustion engine activity response is shown below. Businesses operating internal combustion engines have by far the greatest percentage of workers employed from 4 a.m. to 8 a.m. From 4 a.m. to 8 a.m. these businesses employ 23% of their work force and thus 23% of their emissions for the day occur in this early morning time frame. This is more than twice the 9% activity rate for all businesses. The work force at businesses using solvents is about twice that of all businesses from midnight to 8 a.m. At businesses using gas ovens, the work force operates in three distinct shifts. 6% of the work force is employed from midnight to 8 a.m., 55% from 8 a.m. to 4 p.m., and 39% from 4 p.m. to midnight. Note that the 3% of the work force employed from 4 a.m. to 8 a.m. equals one-third of the 9% reported by all businesses. The 19% of the work force employed from 8 p.m. to midnight is double the 9% average employed by all businesses. Thus, businesses using gas ovens show lower early morning and higher evening worker activity relative to the average of all businesses surveyed.

Table F-3. Weekday business activity as a percentage of work force employed by time of day.

CATEGORY	MIDNIGHT – 4 A.M.	4 A.M. – 8 A.M.	8 A.M. – NOON	NOON – 4 P.M.	4 P.M. – 8 P.M.	8 P.M. - MIDNIGHT
All Survey Respondents	3%	9%	32%	32%	15%	9%
Use of Engine Oils	3%	23%	33%	28%	9%	4%
Use of Gas Ovens	3%	3%	27%	28%	20%	19%
Operation of Internal Combustion Engines	3%	23%	33%	28%	9%	4%
Use of Solvents	6%	14%	28%	28%	13%	11%

Table F-4 presents the percentage of workers employed on Saturday by 4-hour shift of the day based on all survey respondents and by businesses with select activities. The lowest level of employment is from midnight to 4 a.m. and the highest level of worker employment occurred from 8 a.m. to noon. This is true of all survey respondents and for businesses with emission-related activities. Worker activity at businesses with specific activities are factors of 2 to 5 higher from midnight to 8 a.m. and as much as a factor of two lower from 4 p.m. to midnight than at all businesses surveyed on Saturday.

At businesses using solvents, 5% of the work force is employed from midnight to 4 a.m. and 7% from 4 a.m. to 8 a.m. These activity levels are about twice the 2% and 4% levels reported by all businesses during the same time periods. At businesses using solvents, 9% of the work force is employed from 4 p.m. to 8 p.m. and 6% from 8 p.m. to midnight. These activity levels are about half the 19% and 14% levels reported by all businesses during the same time period.

Table F-4. Saturday business activity as a percentage of work force employed by time of day.

CATEGORY	MIDNIGHT – 4 A.M.	4 A.M. – 8 A.M.	8 A.M. – NOON	NOON – 4 P.M.	4 P.M. – 8 P.M.	8 P.M. - MIDNIGHT
All Survey Respondents	2%	4%	33%	29%	19%	14%
Use of Engine Oils	11%	14%	26%	21%	15%	12%
Use of Gas Ovens	6%	6%	35%	34%	11%	9%
Operation of Internal Combustion Engines	11%	14%	26%	21%	15%	12%
Use of Solvents	5%	7%	41%	32%	9%	6%

Businesses using engine oils and those operating internal combustion engines are found to have identical levels of worker activity by hour of day. From midnight to 8 a.m., these businesses employed 25% of their work force, which is roughly equivalent to the 27% employed from 4 p.m. to midnight. At businesses using gas ovens 6% of the work force is employed from midnight to 8 a.m. This is the lowest level of activity at businesses using gas ovens. From 4 p.m. to 8 p.m., businesses using gas ovens employ 11% of their employees.

In summary, we have found that on Saturday, businesses with emission-related activities have employment patterns different from other businesses. Those businesses with emission-related activities have higher employment in the early morning from midnight to 8 a.m. than that of all survey respondents. Conversely, businesses with emission-related activities have lower employment in the evening from 8 p.m. to midnight than would be estimated from the pattern of employment reported by all survey respondents.

Table F-5 lists the percentage of workers employed on Sunday by 4-hour shift based on all survey respondents and by businesses with select activities. At businesses using solvents, 12% of the work force for the day is employed from midnight to 4 a.m. and 16% from 4 a.m. to 8 a.m. These activity levels are about five times the 2% and 3% levels reported by all businesses during the same time periods. At businesses using solvents, 19% of the work force is employed from 4 p.m. to 8 p.m. and 16% from 8 p.m. to midnight. These activity levels are about 25% lower than the 24% and 19% levels reported by all businesses during the same time period.

Table F-5. Sunday business activity as a percentage of work force employed by time of day.

CATEGORY	MIDNIGHT – 4 A.M.	4 A.M. – 8 A.M.	8 A.M. – NOON	NOON – 4 P.M.	4 P.M. – 8 P.M.	8 P.M. - MIDNIGHT
All Survey Respondents	2%	3%	26%	26%	24%	19%
Use of Engine Oils	13%	17%	17%	17%	19%	16%
Use of Gas Ovens	12%	13%	21%	20%	18%	16%
Operation of Internal Combustion Engines	13%	17%	17%	17%	19%	16%
Use of Solvents	12%	16%	18%	19%	19%	16%

Businesses using engine oils and operating internal combustion engines are found to have roughly identical levels of worker activity by hour of day. From midnight to 4 a.m. and 4 a.m. to 8 a.m., these businesses employed 13% and 17% of their work force for the day. This is more than six times the 2% and 3% employment percentages from all businesses surveyed.

At businesses using gas ovens, 12-13% of the work force is employed from midnight to 8 a.m., which is about six times the 2% and 3% employed by all businesses from midnight to 4 a.m. and 4 a.m. to 8 a.m. From 4 p.m. to 8 p.m., businesses using gas ovens employ 16-18% of their work force for the day, which is substantially lower than the 19-24% employed by all businesses.

F-2. UNCERTAINTY DISCUSSION

The number of businesses sampled was relatively small. As a result, the number of business respondents who were engaged in any particular emission-related activity was also small. For example, only eight businesses reported the use of gas ovens. If the business with the largest number of workers using gas ovens had not been selected as part of the survey, we would have obtained a percentage of 16% on weekdays and 11% on both Saturday and Sunday of workers employed by day of week. As shown in **Table F-6**, the weekday percentage of 16% is about 10% lower than the 18% estimate based on all survey respondents using gas ovens. The Saturday percentage of 11% is 22% higher than the 9% based on all survey respondents using gas ovens. The Sunday percentage of 11% is more than three times higher than the 3% based on all survey respondents using gas ovens. The 10% change for weekdays (Monday through Friday), 22% change for Saturday, and factor of three change on Sunday provides evidence of the level of uncertainty associated with small sample sizes.

Table F-6. Business activity as a percentage of workers employed by day of week.

BUSINESS ACTIVITY (EXCEPT AS NOTED)	WEEKDAY (MONDAY-FRIDAY)	SATURDAY	SUNDAY
Use of Gas Ovens	18%	9%	3%
Use of Gas Ovens (excluding the survey results from one business)	16%	11%	11%